

APPENDIX H: STATE-BY-STATE PROJECTIONS OF THE EFFECTIVENESS AND COSTS OF A TAX ON SULFUR EMISSIONS

The primary purpose of this study was to provide an initial projection of the effectiveness and costs of a uniform national tax on sulfur emissions. As demonstrated in ch. 5, the effects of such a tax on local air quality can be expected to vary from region to region across the country depending on local climatic conditions and on the type, size, and geographic distribution of polluting sources. Since the emissions response model developed for this study uses a listing of discrete sulfur emissions sources, it is possible to aggregate the behavior of the sources below a national level to obtain regional projections of effectiveness and costs. This has been done on a State-by-State basis in this appendix to provide insight regarding the possible regional differences in responses to a tax on sulfur emissions. The reader is cautioned, however, that these projections are very preliminary.

The projected State-by-State responses to a tax on sulfur emissions are shown in table H.1. Comparison of the projected responses for four States chosen for expositional purposes follows.

The cost of sulfur emissions control varies significantly from State-to-State due to differences in the type, number, and size of the emissions sources present. Marginal cost of control curves for Alabama, Indiana, New York, and Texas utilizing the tabular data are presented in figure H.1. The amount of reduction in emissions induced by the tax will vary considerably among these four States. For example, for a marginal cost of \$300 per ton, sources in Texas could reduce emissions by 175,000 tons annually; those in Indiana, 700,000 tons annually. The remaining emissions for each State for alternative tax rates are shown in figure H.2.

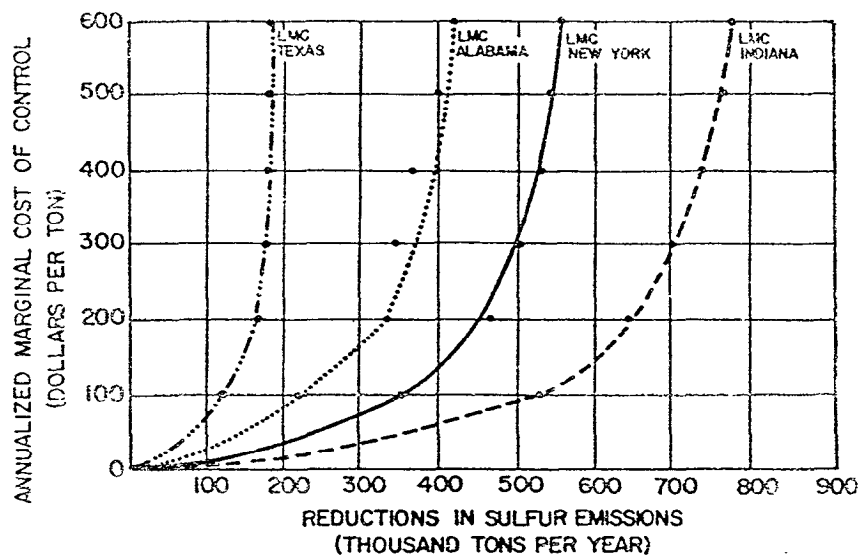


Figure H.1. Marginal cost of reductions in sulfur emissions from all major sources combined in selected States. (Source: Research Triangle Institute).

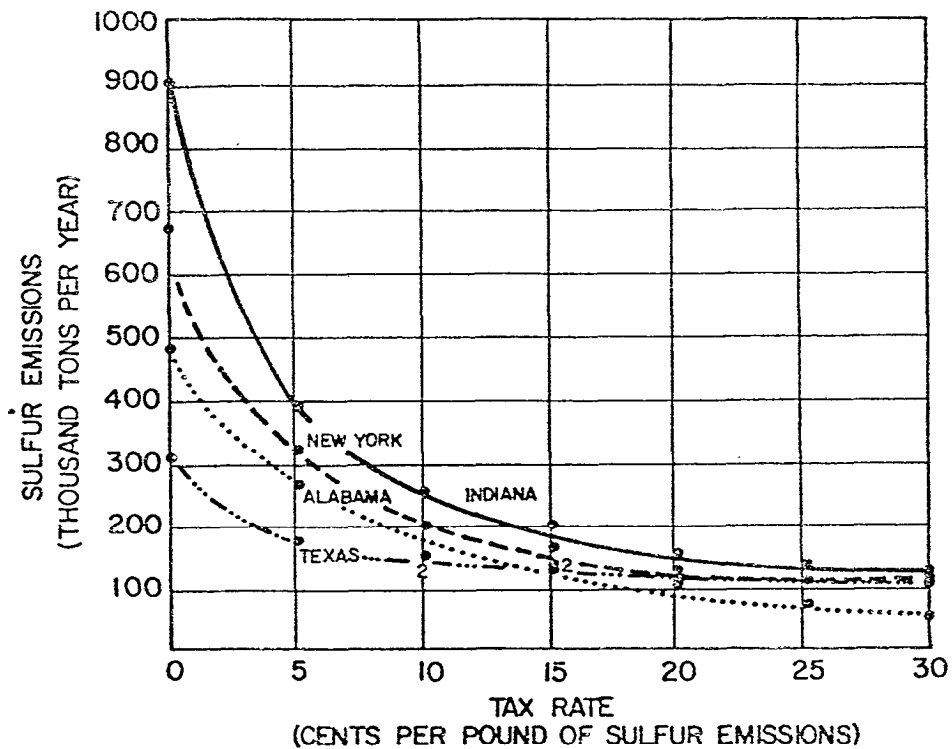


Figure H.2. Effectiveness of a tax on the sulfur emissions from all major sources combined in selected States. (Source: Research Triangle Institute).

Table H.1. Projected State-by-State responses to a national tax on sulfur emissions

State	Tax rate (cents per pound of sulfur emissions)	Emissions (thousand tons)	Reductions in emissions from zero tax (thousand tons)	Total annual cost (thousands)	Annualized control costs (thousands)	Annual tax payment (thousands)
Alabama	0	482	-	-	-	-
	5	262	220	40,744	24,070	16,674
	10	146	336	1,446	766	670
	15	135	348	88,023	57,227	33,616
	20	128	355	105,421	63,861	41,560
	25	83	399	120,934	89,034	31,900
	30	58	424	131,707	106,388	25,319
Alaska	0	1	-	-	-	-
	5	1	0	92	0	92
	10	24	723	24,514	19,753	4,761
	15	1	0	232	28	204
	20	1	0	300	28	272
	25	0	1	348	127	221
	30	0	1	392	127	266
Arizona	0	764	-	-	-	-
	5	175	589	37,164	19,881	17,183
	10	38	725	42,757	35,348	7,410
	15	35	728	46,556	36,076	10,480
	20	30	734	49,977	40,753	9,224
	25	30	734	53,029	38,378	14,651
	30	30	734	55,918	38,512	17,506
Arkansas	0	13	-	-	-	-
	5	12	1	1,250	195	1,415
	10	6	7	2,222	931	1,291
	15	5	8	2,826	1,217	1,609
	20	4	9	3,316	1,583	1,732
	25	4	9	3,770	1,660	2,110
	30	4	9	4,216	1,694	2,523
California	0	212	-	-	-	-
	5	120	92	17,527	7,466	10,061
	10	90	122	30,210	14,816	15,995
	15	75	137	39,825	19,294	20,531
	20	70	142	48,527	22,175	26,352
	25	69	143	56,771	24,651	32,119
	30	68	144	64,721	26,340	38,381
Colorado	0	73	-	-	-	-
	5	53	20	6,207	2,336	3,871
	10	32	41	10,443	5,563	4,880
	15	22	50	13,795	8,255	5,540
	20	19	53	16,413	10,410	6,002
	25	18	54	18,637	10,848	7,789
	30	16	56	20,745	13,061	7,683

Table H.1. Projected State-by-State responses to a national tax on sulfur emissions (con.)

State	Tax rate (cents per pound of sulfur emissions)	Emissions (thousand tons)	Reductions in emissions from zero tax (thousand tons)	Total annual cost (thousands)	Annualized control costs (thousands)	Annual tax payment (thousands)
Connecticut	0	131	-	\$ -	\$ -	\$ -
	5	79	52	17,482	12,233	5,249
	10	37	95	30,777	26,097	4,680
	15	32	100	42,280	35,251	7,029
	20	32	100	53,420	45,759	9,958
	25	26	105	64,135	53,494	10,641
	30	24	107	74,265	62,392	11,873
Delaware	0	70	-	-	-	-
	5	51	19	6,416	2,473	3,944
	10	28	42	10,593	6,187	4,406
	15	25	45	13,664	7,590	6,074
	20	21	49	16,247	9,404	6,843
	25	19	51	18,637	10,557	8,080
	30	18	52	20,878	11,617	9,260
District of Columbia	0	35	-	-	-	-
	5	21	14	3,737	2,361	1,376
	10	10	25	5,777	4,418	1,359
	15	9	26	7,572	5,344	2,528
	20	9	26	9,266	6,199	3,067
	25	9	26	10,917	6,525	4,392
	30	9	26	12,528	7,793	4,735
Florida	0	318	-	-	-	-
	5	284	142	33,998	12,145	21,853
	10	129	296	54,528	35,153	19,375
	15	94	331	66,930	45,114	21,817
	20	72	353	75,727	53,356	22,371
	25	58	368	82,610	59,890	22,720
	30	54	372	88,965	63,215	25,750
Georgia	0	212	-	-	-	-
	5	127	85	15,428	6,836	8,592
	10	76	136	26,467	15,372	11,095
	15	56	156	34,310	21,682	12,628
	20	49	163	40,691	24,905	15,786
	25	32	181	45,418	33,236	12,182
	30	31	182	49,725	35,215	14,510
Hawaii	0	14	-	-	-	-
	5	14	0	1,377	0	1,377
	10	6	8	2,243	1,014	1,229
	15	2	12	2,694	1,995	699
	20	2	12	2,078	830	2,075
	25	2	12	3,116	2,078	1,038
	30	2	12	3,323	2,078	1,245

Table H.1. Projected State-by-State responses to a national tax on sulfur emissions (con.)

State	Tax rate (cents per pound of sulfur emissions)	Emissions (thousand tons)	Reductions in emissions from zero tax (thousand tons)	Total annual cost (thousands)	Annualized control costs (thousands)	Annual tax payment (thousands)
Idaho	0	3	0	\$ 0	\$ 0	\$ 0
	5	2	1	214	89	125
	10	1	2	324	154	170
	15	1	2	417	222	195
	20	1	2	500	221	279
	25	1	2	566	332	234
	30	1	2	624	550	74
Illinois	0	823	-	-	-	-
	5	402	421	68,796	46,436	24,361
	10	228	595	115,228	85,384	29,744
	15	218	609	154,442	104,833	49,608
	20	196	627	191,225	128,760	62,465
	25	172	651	225,668	155,884	69,784
	30	137	686	253,407	187,161	65,245
Indiana	0	901	-	-	-	-
	5	378	523	82,278	62,071	19,907
	10	256	644	139,086	119,511	33,359
	15	198	702	184,481	142,832	41,650
	20	172	728	224,521	173,594	50,926
	25	137	763	260,845	210,256	50,589
	30	131	770	292,003	231,529	60,474
Iowa	0	84	-	-	-	-
	5	55	29	7,066	3,216	3,850
	10	35	49	12,401	6,958	5,443
	15	25	59	16,721	10,573	6,148
	20	19	65	19,793	13,542	6,251
	25	18	66	22,513	15,078	7,435
	30	17	67	25,096	16,504	8,592
Kansas	0	45	-	-	-	-
	5	36	10	4,332	1,243	3,089
	10	32	14	10,148	2,566	5,815
	15	25	20	11,837	4,658	7,180
	20	24	21	14,891	5,688	9,202
	25	24	22	17,828	6,603	11,225
	30	24	22	20,728	7,234	13,494
Kentucky	0	633	-	-	-	-
	5	272	361	34,248	19,514	14,734
	10	157	476	75,820	39,843	18,734
	15	149	484	75,820	43,534	32,287
	20	135	498	92,135	50,789	41,346
	25	94	538	104,588	69,904	34,683
	30	53	579	112,863	93,697	19,166

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State	Tax rate (cents per pound of sulfur emissions)	Emissions (thousand tons)	Reductions in emissions from zero tax (thousand tons)	Total annual cost (thousands)	Annualized control costs (thousands)	Annual tax payment (thousands)
Louisiana	0	118	-	\$ -	\$ -	\$ -
	5	108	10	11,085	441	10,645
	10	59	59	18,212	6,571	11,642
	15	55	63	23,871	7,592	16,279
	20	52	66	29,183	8,582	20,600
	25	51	66	34,360	8,740	25,621
	30	51	66	39,527	8,742	30,786
Maine	0	23	-	-	-	-
	5	14	9	2,072	1,151	921
	10	6	16	3,253	2,520	733
	15	5	16	4,111	2,827	1,284
	20	5	17	4,881	3,348	1,533
	25	4	17	5,573	3,719	1,854
	30	4	18	6,196	4,304	1,892
Maryland	0	318	-	-	-	-
	5	171	147	23,403	12,574	10,829
	10	104	215	40,709	26,245	14,464
	15	89	230	53,625	33,278	20,347
	20	72	247	63,976	41,579	22,397
	25	56	263	72,550	51,114	21,436
	30	49	269	80,127	56,759	23,368
Massachusetts	0	352	-	-	-	-
	5	170	181	26,651	16,644	10,007
	10	107	245	41,458	27,160	14,298
	15	75	277	52,370	37,011	15,359
	20	69	283	61,248	24,124	37,124
	25	55	297	69,091	48,711	20,380
	30	53	299	76,298	51,182	25,116
Michigan	0	779	-	-	-	-
	5	313	466	73,496	55,194	18,303
	10	187	591	120,400	95,981	24,420
	15	164	615	159,530	123,584	35,948
	20	122	657	192,488	156,595	35,893
	25	111	669	222,595	180,579	42,016
	30	108	672	250,965	474,297	76,666
Minnesota	0	248	-	-	-	-
	5	147	101	15,333	5,449	9,884
	10	77	170	26,079	15,416	10,663
	15	64	184	33,542	19,179	14,363
	20	56	192	40,117	22,847	17,270
	25	44	203	45,355	27,878	17,477
	30	36	212	50,122	33,722	16,399

Table H.1. Projected State-by-State responses to a national tax on sulfur emissions (con.)

State	Tax rate (cents per pound of sulfur emissions)	Emissions (thousand tons)	Reductions in emissions from zero tax (thousand tons)	Total annual cost (thousands)	Annualized control costs (thousands)	Annual tax payment (thousands)
Mississippi	0	28	-	-	-	-
	5	20	7	2,071	370	1,701
	10	16	12	3,816	1,106	2,711
	15	15	13	5,302	1,236	4,066
	20	13	15	6,655	1,236	4,681
	25	13	15	7,890	2,115	5,775
	30	13	15	9,110	2,120	6,990
Missouri	0	318	-	-	-	-
	5	196	122	27,218	13,075	14,143
	10	117	201	46,084	28,261	17,824
	15	87	231	40,147	38,506	20,567
	20	74	244	70,037	45,698	24,339
	25	51	267	78,376	58,425	19,951
	30	46	272	85,442	63,523	21,919
Montana	0	303	-	-	-	-
	5	38	268	18,509	14,842	3,369
	10	35	270	22,221	14,935	7,207
	15	35	271	25,771	15,509	10,261
	20	31	275	29,027	16,884	12,148
	25	31	275	32,066	17,059	15,007
	30	31	275	35,093	17,059	18,034
Nebraska	0	133	-	-	-	-
	5	24	109	5,682	4,071	1,610
	10	16	117	7,649	5,228	2,421
	15	12	121	9,144	6,302	2,842
	20	9	124	10,306	7,267	3,038
	25	9	124	11,374	7,749	3,625
	30	8	125	12,384	8,156	4,228
Nevada	0	117	-	-	-	-
	5	17	100	6,654	5,433	1,222
	10	12	105	8,474	6,568	1,906
	15	12	105	9,956	6,866	3,091
	20	11	106	11,382	7,557	3,826
	25	9	108	12,632	5,606	2,637
	30	9	108	13,819	8,943	4,876
New Hampshire	0	84	-	-	-	-
	5	54	31	5,542	1,932	3,610
	10	29	56	9,649	5,524	4,125
	15	20	65	12,072	7,737	4,335
	20	17	68	13,910	8,853	5,057
	25	11	73	15,363	11,245	4,110
	30	11	73	16,628	11,409	5,219

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State	Tax rate (cents per pound of sulfur emissions)	Emissions (thousand tons)	Reductions in emissions from zero tax (thousand tons)	Total annual cost (thousands)	Annualized control costs (thousands)	Annual tax payment (thousands)
New Jersey	0	354	-	\$ -	\$ -	\$ -
	5	209	145	32,249	17,339	14,910
	10	123	231	52,500	33,755	18,745
	15	104	250	67,330	41,901	25,430
	20	88	266	79,780	50,247	29,533
	25	82	272	90,570	55,558	35,012
	30	70	284	100,030	63,840	36,191
New Mexico	0	305	-	-	-	-
	5	150	256	30,135	21,082	9,053
	10	111	295	46,852	30,403	16,452
	15	75	330	58,112	41,300	16,812
	20	64	331	67,495	83,786	19,908
	25	34	371	74,200	62,818	11,381
	30	32	373	79,632	65,855	13,776
New York	0	671	-	-	-	-
	5	318	353	57,955	39,053	18,903
	10	197	474	91,751	71,111	26,640
	15	171	500	119,748	81,228	38,520
	20	155	516	144,515	95,310	49,205
	25	127	545	166,082	115,371	50,711
	30	123	549	185,769	124,902	60,867
North Carolina	0	1,656	-	-	-	-
	5	636	1,020	686	108,572	234
	10	270	1,186	235,974	175,168	60,806
	15	260	1,396	297,306	252,561	44,745
	20	251	1,405	346,194	279,036	67,158
	25	129	1,527	372,430	341,036	31,454
	30	123	1,533	396,268	352,373	40,895
North Dakota	0	54	-	-	-	-
	5	39	16	3,861	1,044	2,817
	10	27	27	7,088	2,893	3,985
	15	21	33	9,420	4,154	5,266
	20	17	37	11,265	5,435	5,830
	25	15	40	12,713	6,989	5,724
	30	14	40	14,057	7,075	6,982
Ohio	0	1,172	-	-	-	-
	5	699	473	112,033	64,943	47,090
	10	392	780	187,572	132,062	55,510
	15	276	896	241,353	181,590	59,763
	20	241	931	288,813	215,586	73,227
	25	204	968	331,615	252,637	78,978
	30	193	979	370,038	277,584	92,454

Table H.1. Projected State-by-State responses to a national tax on sulfur emissions (con.)

State	Tax rate (cents per pound of sulfur emissions)	Emissions (thousand tons)	Reductions in emissions from zero tax (thousand tons)	Total annual cost (thousands)	Annualized control costs (thousands)	Annual tax payment (thousands)
Oklahoma	0	72	-	\$ -	\$ -	\$ -
	5	24	48	4,035	2,010	2,337
	10	21	50	6,311	2,221	4,400
	15	20	52	8,400	2,596	11,382
	20	19	53	10,319	2,947	7,373
	25	19	54	12,170	3,152	9,018
	30	17	54	13,992	3,202	10,791
Oregon	0	3	-	-	-	-
	5	2	1	280	131	149
	10	1	-2	405	222	149
	15	1	2	509	237	238
	20	1	2	606	245	327
	25	1	2	704	244	426
	30	1	2	795	280	481
Pennsylvania	0	1,482	-	-	-	-
	5	707	775	139,875	97,959	41,915
	10	420	1,062	228,005	172,716	55,288
	15	346	1,136	291,985	216,984	75,001
	20	280	1,202	346,884	263,623	83,261
	25	234	1,248	395,205	306,864	88,341
	30	215	1,267	438,083	337,766	100,318
Rhode Island	0	24	-	-	-	-
	5	12	12	2,224	1,462	762
	10	7	12	3,168	2,285	883
	15	7	17	4,033	2,605	1,429
	20	7	17	4,826	2,805	2,021
	25	6	18	5,582	3,152	2,430
	30	6	18	6,292	3,281	3,011
South Carolina	0	306	-	-	-	-
	5	148	158	27,337	18,708	8,629
	10	83	223	45,109	34,569	10,540
	15	66	240	56,824	43,376	13,448
	20	59	247	67,097	49,884	17,213
	25	53	253	76,207	55,723	20,484
	30	38	268	82,836	65,837	16,999
South Dakota	0	13	-	-	-	-
	5	9	4	954	340	614
	10	6	7	1,649	690	959
	15	6	7	2,218	861	1,357
	20	4	9	2,676	1,351	1,325
	25	4	9	3,092	1,471	1,621
	30	4	9	3,492	1,496	1,996

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State	Tax rate (cents per pound of sulfur emissions)	Emissions (thousand tons)	Reductions in emissions from zero tax (thousand tons)	Total annual cost (thousands)	Annualized control costs (thousands)	Annual tax payment (thousands)
Tennessee	0	220	-	\$ -	\$ -	\$ -
	5	192	34	17,811	2,886	14,925
	10	142	83	33,201	8,888	24,989
	15	140	86	47,200	9,784	37,416
	20	137	89	60,982	10,576	37,416
	25	136	90	74,612	10,841	63,766
Texas	30	47	178	84,178	60,506	23,672
	0	305	-	-	-	-
	5	181	125	23,897	6,184	17,713
	10	150	156	40,077	10,629	29,448
	15	137	168	54,249	13,551	40,697
	20	134	171	67,700	14,751	52,949
Utah	25	133	172	80,994	14,978	66,015
	30	132	183	94,201	15,375	78,819
	0	34	-	-	-	-
	5	33	0	2,869	131	2,738
	10	17	17	5,251	239	2,950
	15	17	17	7,002	346	4,594
Vermont	20	14	20	8,499	3,666	4,833
	25	12	22	9,666	4,450	5,216
	30	11	23	10,730	5,140	5,590
	0	5	-	-	-	-
	5	2	2	298	153	145
	10	1	3	450	292	158
Virginia	15	1	4	583	337	246
	20	1	4	699	366	333
	25	1	4	800	387	413
	30	1	4	891	511	380
	0	213	-	-	-	-
	5	119	94	19,876	12,046	7,829
Washington	10	74	151	47,547	30,179	15,104
	15	63	151	47,547	30,179	15,104
	20	55	159	58,308	40,132	18,176
	25	45	169	66,849	48,368	18,581
	30	41	193	74,124	53,640	20,483
	0	120	-	-	-	-
Washington	5	55	65	7,606	2,433	5,172
	10	21	98	10,300	6,027	4,055
	15	17	102	12,294	7,006	5,098
	20	17	102	14,110	7,209	7,001
	25	17	103	15,921	7,270	8,651
	30	17	103	17,712	7,377	10,335

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State	Tax rate (cents per pound of sulfur emissions)	Emissions (thousand tons)	Reductions in emissions from zero tax (thousand tons)	Total annual cost (thousands)	Annualized control costs (thousands)	Annual tax payment (thousands)
West Virginia	0	558	-	\$ -	\$ -	\$ -
	5	249	309	34,520	20,764	13,756
	10	147	410	59,143	40,688	18,455
	15	132	426	75,361	46,825	28,536
	20	124	434	90,032	51,318	38,715
	25	79	479	102,197	73,544	28,654
	30	55	503	110,057	87,816	22,242
Wisconsin	0	383	-	-	-	-
	5	189	194	27,738	16,468	11,270
	10	101	282	45,874	33,416	12,458
	15	84	300	58,415	41,185	17,230
	20	72	312	69,119	47,855	21,165
	25	55	329	78,690	59,020	19,670
	30	49	335	86,339	64,610	21,729
Wyoming	0	78	-	-	-	-
	5	57	22	7,232	242	5,650
	10	37	42	12,510	1,541	7,137
	15	30	57	15,351	2,648	8,969
	20	31	51	18,332	2,923	11,212
	25	22	58	20,849	2,941	10,275
	30	20	59	22,929	3,333	11,563

Source: Research Triangle Institute.

